

## NORTH-CENTRAL FORECAST DISTRICT.

No storms of marked force crossed the upper Lakes, and warnings were ordered but once, on the 3d. The highest wind recorded during this storm was 60 miles an hour, from the northeast, at Duluth, Minn.—*H. J. Cox, Professor and District Forecaster.*

## ROCKY MOUNTAIN FORECAST DISTRICT.

The month was unusually cool, with heavy rains on the eastern slope. For the frost that visited western Wyoming on the 25th warnings were issued on the morning of the 24th.—*J. H. Brandenburg, District Forecaster.*

## SOUTH PACIFIC FORECAST DISTRICT.

The month was uneventful. On the morning of the 3d high winds occurred at Point Reyes, Southeast Farallon, and on Mount Tamalpais, while at San Francisco the wind was light. A light shower, that was forecast, occurred at San Francisco June 30. In a record of fifty-five years this is the only rainfall shown for June 30.—*A. G. McAdie, Professor and District Forecaster.*

## NORTH PACIFIC FORECAST DISTRICT.

The month was dry and cool, and frosts occurred as late as the 25th, nearly all of which were forecast twenty-four hours in advance.

The lower Columbia River remained nearly on a stand slightly below 20 feet until the 13th, when it slowly fell until the end of the month.—*E. A. Beals, District Forecaster.*

## RIVERS AND FLOODS.

Destructive floods, due to excessive precipitation during the first few days of the month, occurred along the Arkansas, Red, and Kaw rivers, and their tributaries. The amount of property destroyed or damaged was large, and the loss to the farmers and planters on the bottom lands was especially heavy. All growing crops were badly washed, and in many instances completely destroyed.

A description of the flood conditions along the Arkansas River, prepared by Mr. E. B. Richards, official in charge, U. S. Weather Bureau office, Little Rock, Ark., follows:

The flood of June, 1904, in the lower Arkansas River, owed its inception to the general and excessive rainfalls during the first few days of the month in the valleys drained by the Arkansas and its tributaries. These rains caused a decidedly rapid rise at Fort Smith from the 3d to the 7th, inclusive; the stage at Fort Smith was 12.7 feet at 7 a. m. on the morning of the 3d, and 21.5 feet on the following morning, a rise of 8.8 feet in twenty-four hours. In consequence of this rapid rise at Fort Smith, this office at once called for special readings at Fort Smith and Dardanelle for the 5th, 6th, and 7th. Flood warnings were issued on the 4th to points above and below Little Rock, forecasting a stage of 27.0 feet at Little Rock, just 0.9 foot lower than the highest stage reached by the disastrous flood of 1892, and 0.5 foot lower than the flood of April, 1898, when the lowlands along the Arkansas, from Little Rock to the mouth, were overflowed and devastated. This warning was widely disseminated by telegraph, telephone, and through the mails and the press. On the morning of the 5th another flood bulletin was issued and the warning disseminated, and bulletins were posted in prominent public places throughout the city.

The crest of this rise reached Little Rock on the 11th, and a maximum stage of 27.8 feet was attained at 7 p. m. of that date. The danger line was passed during the night of the 5th and was exceeded 14 consecutive days thereafter. At 7 p. m. of the 5th the stage at Little Rock was 22.6 feet, only 0.4 foot below the danger line; at 7 a. m. of the 6th the stage was 24.7 feet, a rise of 11.6 feet since the morning of the 5th. On the 8th warnings were sent out by mail forecasting a stage in excess of 27.0 feet. The river continued to rise slowly until the 12th. On the morning of that date the gage read 27.7 feet; at 7 p. m. it read 27.8 feet, the highest stage since 1892, being just 0.1 foot lower than the highest stage of the flood of that year, and 0.3 foot higher than the maximum stage forecast by the Weather Bureau.

The Little Rock Board of Trade, appreciating the value of these warnings, and realizing the great damage that would result from such a stage at Little Rock, chartered the steamer *Henry Sheldon*, and held her in readiness to start at a moments notice to render assistance to the dwellers in the lowlands along the Arkansas River. This precaution, while wise and timely, proved to be unnecessary, for the inhabitants of the

lowlands had not forgotten the terrible destruction caused by the floods of 1892 and 1898, which had been predicted by the Weather Bureau, and, with the great calamities which attended those floods still fresh in their memories, they acted promptly upon the first note of warning, and moved all of their stock and movable property to places of safety, and every precaution was taken to save life and property. The Arkansas Gazette, in the issue of the 8th, said: "Up to the present time it is believed there has been no loss of life, and this is attributed to the early warnings sent out by the Weather Bureau. Section Director Richards made his prediction of a 27.0-foot stage on Saturday, and as a consequence occupants of the lowlands received ample warning."

The warnings had been sent out in ample time to enable people to move their stock and property to places of safety. Levees were strengthened or built higher and new levees were constructed in some heretofore unprotected localities. Notwithstanding the precautions taken and the extra work done, many levees were broken by the high water with its swift current (consequent upon the low stage of the Mississippi River), and many thousands of acres of growing and flourishing crops destroyed, thousands of acres of land inundated and washed away, and houses and fences swept away by the relentless torrent.

The damage done by this flood along the Arkansas, from Fort Smith to the mouth, was greater than by any flood heretofore experienced, for the reason that more land in the bottoms was under cultivation, and it was too late in the season for the farmers to replant their devastated fields after the water had receded.

Navigation was seriously interrupted, as landing at many points along the river was difficult and dangerous; boats could not pass under the bridges, nor could they breast the swift running current.

The fall was slow and steady from the 12th to the 28th, when, by reason of the heavy rains of the 28th in the tributary branches in the upper Arkansas, which were augmented by continuous local rains in the lower valley, the river began to rise again at Fort Smith and Dardanelle, and at Little Rock on the 30th; this rise was only temporary and not serious, and no further damage was done.

A rapid rise occurred in the Kaw River and its tributaries on the 3d, and as weather conditions favored a continuance of the heavy rains, a repetition of the disastrous floods of the spring of 1903 was feared. Fortunately, the rains ended on the 5th, but in the meantime many of the smaller streams had reached a flood stage, with a consequent overflowing of all property interests along their courses. About one-fourth of Newton, Kans., was overflowed; many persons were rendered homeless, and much valuable property lost or damaged.

At Emporia, Kans., three inches of precipitation fell within a few hours, and the Cottonwood River rose at the rate of six inches an hour, flooding the business portion of the town and destroying much property.

The floods along the Red River were also of a severe character and were the cause of heavy losses, particularly to growing crops on the lowlands.

The following report regarding these floods is furnished by Mr. J. W. Cronk, official in charge, United States Weather Bureau office, Shreveport, La.

From June 9 to 20, inclusive, the Red River was above the danger line of 28 feet at Fulton, Ark., the highest stage, 31.6 feet, being recorded on June 13 and 14. Above Fulton, at Arthur City, Tex., the river reached a stage of 23 feet on June 6 and 24 feet on June 13. Below Fulton, at Shreveport, the river rose to its highest stage, 28.5 feet, on June 24 and 25. The flood was caused by heavy rainfall unevenly distributed over the upper watershed of the Red River from June 3 to 9.

Prompt warnings from the Weather Bureau prevented loss of life, livestock, household goods and other portable property in the overflowed districts, which embraced the unprotected lowlands in the Red River Valley, in Arkansas and northern Louisiana, above Shreveport. Damage to crops (principally cotton), however, was heavy, many thousands of acres of cultivated bottom lands being unprotected by levees.

The press, levee officials, including the State's Chief Engineer, and the people, without exception, have praised the work of the Bureau in no uncertain words. That this praise is deserved may be judged from the fact that warnings issued from two to ten days in advance were noticeable for their correctness, giving nearly the exact date and height of the flood stage.

As to the benefits derived from warnings, above \$100,000 is the nearest estimate that can be made at this time of the value of property protected and saved, and that amount would not cover the unavoidable loss in the cotton crop.

The forecasts of weather and river stages by the Weather Bureau during these floods were very accurate and received the commendation of the press and public generally. Farm-

ers, planters, manufacturers, and others interested received timely warnings, and all portable property was removed to places of safety.

The highest and lowest water, mean stage, and monthly range at 194 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown

on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

## CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions during June are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

**Alabama.**—Month, as a whole, fairly favorable for crop growth, though rainfall insufficient in scattered portions; rains of last decade beneficial to all crops. Cotton, corn, and minor crops made satisfactory progress, except where rain was insufficient; cotton bloomed by 10th, and fruited satisfactorily during last two weeks, when early corn was earing well; oats and wheat harvested, oats light yield, but wheat good; early peaches marketed, with good yield; late peaches continued promising.—*F. P. Chaffee.*

**Arizona.**—Temperature averaged slightly below normal. The days were warm and the nights cool. Light frosts occurred in northern districts. The droughty conditions, which had prevailed for several months, continued during June. In the lower Colorado Valley crops made fine growth, but elsewhere crop conditions, which were poor at the beginning of the month, continued to deteriorate. Range feed and stock water were very scarce, and stock suffered greatly, with much loss by death.—*M. E. Blystone.*

**Arkansas.**—The temperature was below normal and the rainfall excessive. Large area overflowed in the Arkansas and Red River valleys first of month, causing loss of all crops; some overflowed land was replanted to corn and peas. Cotton small but healthy; made good growth; chopping about completed; some blooming. Corn about all laid by in good condition; full crop indicated. Potatoes good crop. Wheat and oat harvest progressing; yields satisfactory. Apples and peaches promise good crops.—*O. C. Burrows.*

**California.**—Northerly winds during the first half of the month caused still further damage to the grain crop, but fruit and grapes were not materially injured. More favorable weather prevailed toward the close and grain showed considerable improvement. Wheat, oats, and barley will fall below the average in yield and quality. Many varieties of deciduous fruits were yielding light crops. The hay crop now being harvested is unusually good. Grapes will yield a heavy crop.—*Alexander G. McAdie.*

**Colorado.**—Month favorable. Beet thinning finished, excellent crop. Some potatoes replanted in northern counties, at end of month crop was in good condition with early varieties ready for market. Rain caused rapid improvement in ranges in extreme southern counties and lower Arkansas Valley. Wheat and alfalfa generally good crops. Oats excellent. Corn backward and weedy, but improved rapidly with warmer weather. Fine prospects for fruit.—*F. H. Brandenburg.*

**Florida.**—The deficiency in rain, mostly over the cotton counties, with cool nights during the early part of the month retarded growth, but later warmth caused improvement; fruiting was heavy, though the plant was smaller than the average. Early corn was very poor; the late planted was good. Minor crops did well. Citrus fruits were in good condition, though much of the crop was lost during May drought. The pineapple crop was damaged by dry weather.—*A. J. Mitchell.*

**Georgia.**—The temperature was practically normal; the precipitation much below average. The distribution of rainfall was irregular. Drought prevailed in many sections, while in the extreme southeast and a few of the northeastern and northwestern counties the total falls varied from 5 to 8.50 inches. The outlook for cotton was generally encouraging; corn, as a rule, made satisfactory progress; wheat yielded well; large shipments of peaches were made.—*J. B. Marbury.*

**Idaho.**—The month was characterized by two cool periods, culminating in damaging frosts in many localities on the 11th and 12th and the 24th and 25th; potatoes, corn, sugar beets, and garden vegetables were badly frozen in exposed districts, and some alfalfa, small grain, and fruit were injured. With exception of these frost periods weather conditions were generally favorable, water for irrigation was abundant, and vegetation that escaped frost damage made satisfactory growth.—*Edward L. Wells.*

**Illinois.**—Corn made thrifty, but not rapid growth; oats were generally promising, although heading short; wheat harvesting was well under way at end of month with satisfactory yield; clover was yielding well in the southern half of State, but the crop was short in the northern district; berries were plentiful, but apples were unpromising.—*Wm. G. Burns.*

**Indiana.**—Precipitation was deficient, but fairly well distributed. The

daily mean temperature averaged about 2° below normal. Planting corn was finished about June 15; a good stand was secured and the crop, although late, was in fair condition. Wheat prospects improved until last week of month when it was attacked by rust; a very light crop was expected. Clover was weedy, and was being harvested. Oats, timothy, and potatoes grew well. Pear and apple trees suffering from blight.—*W. T. Blythe.*

**Iowa.**—June was deficient in temperature, rainfall, and sunshine. Rainfall was unequally distributed, ranging from less than an inch to more than 8 inches. And yet no part of the State suffered heavily from deficiency or excess. On the whole, the month was favorable for the staple farm crops, especially small grain, grass, and vegetables. Corn made a healthy start, though about a week late compared with average. Apples promising. Berry crop good.—*John R. Sage.*

**Kansas.**—Wheat harvest began in southern counties the third week and in central counties the fourth, greatly retarded by wet weather which also damaged some of the grain. Oat cutting began in extreme south last week; crop improved materially. Corn grew rapidly, tasseled in southern counties last week. Grass grew rapidly. First crop alfalfa cut early in month, much damaged by wet weather. Apples dropped badly in several counties, gave fair promise in others. Potatoes marketed in many counties, rotted badly in bottom fields.—*T. B. Jennings.*

**Kentucky.**—The precipitation was quite unevenly distributed, but nearly all sections received enough to keep crops in fair condition. Wheat made great improvement and was being harvested at the close of the month. The nights were too cool for the rapid growth of corn, but it kept vigorous. Less than the usual acreage of tobacco was set out and made good progress. Oats, rye, potatoes, and garden vegetables did well. Fruit did fairly well. Farm work was kept well up.—*H. B. Hersey.*

**Louisiana.**—Seasonable temperature and occasional showers proved very favorable for cotton, but there were several localities where the rainfall was not sufficient. The plant is small for the season of the year, but its general condition may be classed as good; early planted cotton is fruiting nicely. Corn suffered as a result of insufficient rainfall in parts of the eastern and southern districts, but was promising elsewhere. Sugar cane and rice did well. Truck gardens yielded satisfactorily. All crops were well cultivated.—*I. M. Cline.*

**Maryland and Delaware.**—June weather was favorable for agriculture. Rainfall was above normal for the first time since October, 1903. During the last decade wheat harvest made good progress, and much fine hay was secured. Corn was uneven and backward, but well tilled and thrifty. Oats were quite promising. Tobacco grew well and stands were fairly satisfactory. Peaches and apples were plentiful in some localities, but not generally. Other fruits were fair to good.—*Oliver L. Fussig.*

**Michigan.**—Most of month was cool, and a moderate drought prevailed during second decade. The cool, dry weather retarded germination and growth, particularly of corn. Lack of moisture was especially detrimental to meadows, oats, and barley, and shortened strawberry crop considerably. During last decade moderate showers greatly improved meadows, barley, oats, wheat, and rye, and the warmer temperatures forwarded corn and germination of beans and buckwheat. Generally, potatoes and sugar beets made good progress throughout month.—*C. F. Schneider.*

**Minnesota.**—A month of frequent showers and considerable cloudy weather. The rains were generally beneficial, those early in the month helping the recently seeded late oats, barley, flax, and fodder crops. Wheat, oats, and barley grew well all the month, and began heading toward its close. Corn was backward, and in many places poor. Flax and potatoes grew finely. Clover and timothy promised heavy crops. Light frost in northern portions on the morning of the 14th.—*T. S. Outram.*

**Mississippi.**—Crops were kept well cultivated and made fairly good growth. Stands of cotton were generally good; chopping was completed and by the close of the month blooming was becoming general; lice wrought slight damage east. Early corn did well, except east and south, where somewhat injured by dry weather; late corn was promising. Oats made a fair yield north. Peas were planted and generally came up to splendid stands. Sugar cane and melons did well. Peaches were plentiful.—*W. S. Belden.*

**Missouri.**—The first ten days were quite favorable for farming operations and plant growth, but the last three weeks were unfavorable because of too much rain. Over the greater portion of the northwest, southwest, and central sections all farm work was practically stopped; corn fields were foul with weeds; wheat harvesting was much delayed, and considerable damaged by rust; oats suffered from same conditions;